UNITED STATES DISTRICT COURT
FOR THE DISTRICT OF MASSACHUSETTS

C.A. NO. 02-10260-REK

NEXTEL COMMUNICATIONS OF THE MID-ATLANTIC, INC. d/b/a NEXTEL COMMUNICATIONS,

Plaintiff

v.

TOWN OF WAYLAND and ZONING BOARD OF APPEALS Of THE TOWN OF WAYLAND, et al,

Defendants

AFFIDAVIT OF DAVID P. MAXSON

I, David P. Maxson, hereby say that the following is true based on my personal knowledge and experience:

1. I am an adult citizen of the United States.

2. I co-founded Broadcast Signal Lab in 1982 and have been a Managing Partner and Principal Engineer of this radio communications engineering firm which has a principal place of business at 64 Richdale Avenue, Cambridge, Massachusetts, 02140.

3. I hold a Bachelor of Science degree in Broadcasting from Boston University.

4. From 1978 to 1998, I was employed by Charles River Broadcasting Company, Waltham, Massachusetts, where I served as Vice President, Director of Engineering.

5. I have extensive experience in the field of radio frequency engineering, including designing, installing, maintaining, and upgrading radio frequency transmission

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and reception facilities, performing signal coverage and interference analysis, preparing radio frequency allocations engineering for facilities licensed by the Federal Communications Commission, designing and implementing programs and procedures to ensure radio frequency facilities are in compliance with technical regulations and standards, and performing field measurements and analysis of radio frequency signals.

6. I am currently under contract with the Cape Cod Commission and several municipalities, including Groton, Lee, Lenox, Nahant, and Stockbridge, Massachusetts, to provide analysis and recommendations regarding the placement of wireless communications facilities.

7. I am a full member of the Institute of Electrical and Electronics Engineers and a member of the Society of Broadcast Engineers from which I have earned Certified Broadcast Radio Engineer certification. I have testified as an expert witness in the federal district courts under the federal Telecommunications Act of 1996 ("TCA") in cases regarding wireless communications facilities siting, including testimony in Omnipoint Communications v. the Town of Lincoln, Massachusetts, AT&T Wireless PCS, LLC vs. the Town of Concord, Massachusetts, and SBA Tower v. the Town of Kingston, NH, among others.

8. I was one of three experts in radio frequency energy safety who were appointed by the Commonwealth of Massachusetts in 1997 as an ad hoc committee to review and recommend changes to the Commonwealth of Massachusetts Department of Public Health Non-ionizing Radiation safety regulations (105 CMR 122.000).

9. I was project manager in the development of a digital radio frequency communications technology called "FM-Digital," in a collaboration between Charles River Broadcasting Company and Lockheed-Sanders, Nashua, New Hampshire. I authored and presented technical papers on the technology at National Association of Broadcasters Engineering Conferences, among others.

10. I am a member of the National Radio Systems Committee's Digital Audio Broadcasting Subcommittee, which is developing standards that will eventually establish a digital radio broadcasting service in the USA. As a member of the Subcommittee's System Evaluation Working Group, I was principal author of major portions of its system test evaluation guidelines and two subsequent system test evaluation documents. The National Radio Systems Committee is sponsored jointly, by the Consumer Electronics Association and the National Association of Broadcasters, to promote the development of standards and recommendations that promote beneficial uses of the radio spectrum.

11. Under my supervision, Broadcast Signal Lab performed an analysis of contemporary models of radio receivers to determine their susceptibility to certain kinds of interference. I wrote the report on this analysis, which was entered into the public record by my clients in a Federal Communications Commission ("FCC") Notice of Proposed Rulemaking in the matter of Creation of a Low Power Radio Service, Mass Media Bureau Docket #99-25. I presented a technical paper on the subject to the National Association of Broadcasters Engineering Conference and testified before the US House Commerce Committee, Telecommunications Subcommittee on the matter in 1999.

12. I am familiar with portions of the TCA and have advised governmental entities, wireless communications companies, and other parties regarding compliance with provisions of the statute and its subsequent implementations by the Federal Communications Commission ("FCC").

13. I am familiar with FCC rules regarding various Commercial Mobile Radio Services.

14. I am familiar with the requirements of the TCA that do not pre-empt local zoning authority insofar as such authority does not prohibit or have the effect of prohibiting the provision of personal wireless services, does not unreasonably discriminate among providers of functionally equivalent services, and does not regulate placement of personal wireless facilities on the basis of environmental effects of the radio frequency emissions to the extent that they comply with FCC emissions regulations.

15. I have assisted many municipalities in drafting bylaws and ordinances that enable compliance with TCA requirements and the review of proposed facilities subsequently regulated under such bylaws.

16. I have reviewed certain documents related to this proceeding, including portions of the Wayland Zoning Bylaw, Nextel's Complaint and Exhibits thereto, Nextel's summary judgment documents, as well as, *inter alia,* the Decision of the Zoning Board of Appeals, Supplemental Affidavit of Radio Frequency Expert with attached color maps (which also appears as an Exhibit to the Affidavit of William J. Proia at Voulme 1,Tab B filed by Nextel in support of its motion for summary judgment), and a portion of the Wayland Town Zoning Map that shows the

Wireless Communications Services District defined in §198-1502.1 of the Wayland Bylaw ("WCS District"). I also reviewed documents submitted by Nextel to the Town of Weston regarding placement of wireless communications facilities and the Weston Zoning Bylaw regarding wireless communications facilities. I have relied on other resources, including topographic maps, street maps, propagation-modeling software and field measurements, to support my statements in this Affidavit.

17. Based on my review of the above documents and on my technical knowledge, I conclude the following:

a) Nextel's claims that the disputed site is the only site capable of providing wireless service in Wayland is unsubstantiated and incorrect;

b) A bylaw-compliant wireless facility in the WCS District located at the Boston Edison Company transmission tower #102 ("BECO 102") would be capable of providing service to substantially the same area as the proposed Nextel facility (sought to be located at Boston Edison Company transmission tower #111, "BECO 111").

c) Nextel's claims of interference and duplication of coverage if locations in the Wayland WCS District were utilized are erroneous.

d) Nextel's coverage analysis is imprecise, flawed, and erroneous. It misstates the predicted performance of existing and proposed facilities in a manner that gives an incorrect impression of strengths of the proposed facility and weaknesses of a facility in the WCS District.

e) The decision to deny a permit for the Nextel Facility at BECO 111, from the perspective of radio frequency coverage, does not constitute a prohibition of service because analysis of the projected coverage from the WCS District shows that there is no significant difference in the performance of the BECO 111 facility and a facility in the WCS District.

My analysis and reasons for these conclusions are explained below.

18. The Plaintiff (Nextel) alleges "...that the decision of the ZBA [to deny the BECO 111 facility]...has the effect of prohibiting Nextel from providing wireless services to those of its customers who live in or travel through Wayland." (Complaint, paragraph 1). To support this claim, Nextel states it has "demonstrated that the proposed facility [BECO 111] is the only feasible alternative for meeting its need to provide coverage in that, among other things, the Town has restricted wireless facilities to parcels which are either unavailable or unusable by Nextel." (Complaint, par. 23). Nextel continues with an example in which it claims, "Nextel's radio frequency engineers, however, demonstrated that the [Wayland] landfill site would not work because it is too far west, would interfere with an existing Nextel site in Sudbury and would create the need for another antenna facility in east Wayland." (Complaint par. 24). These statements are repeated in Nextel's summary judgment materials.

19. The Supplemental Affidavit of Radio Frequency Expert ("RF Supplement") signed by Supriya Prabhakar on December 27, 2001, states "...to fill the gap in coverage that currently exists in the Town of Wayland, Nextel has designated the Site [BECO 111] as the most appropriate location to construct a wireless facility

to achieve the coverage necessary in light of the absence of any cell sites in the Town of Wayland... The site is the only location that is available and viable that will meet the coverage objective of eliminating the gap in coverage." The RF Supplement continues, "...a site located on the Town's landfill or within the MBTA Right of Way, south of State Route 20, is not a viable alternative to the Site because those locations are too far west and will interfere with the existing Nextel site in Sudbury, and further a site at those locations will not connect with the planned Nextel sites in Weston to the east, thus necessitating another, new tower site somewhere in east Wayland."

20. The Complaint states that Nextel seeks coverage, "in the central part of Wayland, an area which includes important commuter thoroughfares such as Routes 20 and 27." (Complaint, par. 14).

21. Based on these claims and statements by Nextel and its RF engineer, I understand Nextel's position to be as follows:

(a) Nextel claims the BECO 111 site is capable of eliminating any gap in Nextel service in Wayland.

(b) Nextel claims the BECO 111 site is capable of providing reliable service that would make a tower in east Wayland unnecessary.

(c)Nextel claims locations within the Town's WCS District, including the Boston Edison Company transmission towers located in the MBTA right of way south of Route 20, are too far west to provide coverage to eastern Wayland.

(d) Nextel claims locations within the Town's WCS District, including the Boston Edison Company transmission towers located in the MBTA right of way south of Route 20, will interfere with an existing Nextel site in Sudbury.

(e) Nextel claims that connection, or "call hand-off," capability, between the coverage from a Wayland facility and coverage from a Weston facility, particularly along Route 20, is critical to the provision of service.

(f) Nextel claims that a facility located on BECO 111 would reliably hand-off to a planned Weston facility.

(g) Nextel indicates there is no currently operating Nextel facility in the Weston Route 20 corridor, such that the "planned" Weston facility's coverage is not a given.

22. In the RF Supplement, ¶5, Nextel states that two radio frequency plots had been submitted to date in connection with Nextel's appearance before the Board, which plots are not in the record. One of these plots is described to show computer-estimated coverage from antennas 100 feet above a site labeled "Dump." This plot is not part of the public record and apparently was not submitted by Nextel. Without this plot, there is no evidence, however inadequate it may be, that a 100-foot facility in the WCS District would be insufficient.

23. The three-color plots submitted with the RF Supplement depict computer-estimated coverage from three facility configurations. Two plots depict estimated coverage from antennas at the disputed BECO 111 site, one at 100 feet, the approximate proposed antenna height, and the other at the zoning height limit of 35 feet. The third plot depicts computer-estimated coverage from the "Dump" at

the maximum height allowed for a new tower under the Wayland Zoning By-law—a height of 55 feet.

24. The "Dump" site shown on the plots appears to be described inaccurately in the RF Supplement as the "old Wayland Landfill, now the transfer station." The Old Wayland Landfill, described in the Bylaw §198-1502.1, is south of Route 20 and is not the site shown on the Nextel "Dump" plot. The Wayland transfer station is situated north of Route 20, in Wayland, and is part of a parcel referred to as the New Landfill in the Bylaw. This site also appears not to be the site employed by Nextel in its plot of coverage from the "Dump" site. The site marked "Dump" in the Nextel computer estimated coverage plot appears to be at the approximate location of the Sudbury transfer station, which is located on the Sudbury side of the Sudbury/Wayland town line north of Route 20. See my Exhibit DM-1, attached hereto and incorporated herein by reference, for a more detailed analysis of site locations. The site depicted as the "Dump" but which appears to be in Sudbury is about one mile from the BECO 111 tower. (See Exhibit DM-1).

25. The Wayland WCS District south of Route 20 extends easterly from the Sudbury boundary toward the Sudbury River. The WCS District south of Route 20 includes a segment of the MBTA right of way containing eight BECO towers and the area known as the Old Landfill. (See Exhibit DM-1)

26. A location on the Old Landfill parallel to the MBTA right of way and approximately 26 yards from the gate to Route 20 is 0.65 miles from the BECO 111 tower. I used this location for the "drive test" that is described in detail in Exhibit DM-2, attached hereto and incorporated herein by reference.

27. The differences in ground elevation of the Old Landfill site, the BECO 111 site, and the BECO towers numbered 101 and 102 bordering the Old Landfill are less than ten feet, according to topographic maps, my 3-second terrain database, and the Edwards and Kelcey Plan Sheet A-1.

28. The BECO towers in the WCS District are visually identical to the BECO 111 tower and the drawing of the tower in the Exhibits to the Affidavit of William J. Proia.

29. As explained below, the Nextel computer-estimated coverage plots attached to the RF Supplement ("the Plots") are prepared inconsistently and are inherently imprecise, especially when Nextel seeks to use them to support its claim that the WCS District is prohibitory to the provision of service.

30. The Plots are generally run at a very low resolution. The size of each square of color, or "pixel," appears to be about ¼-mile square. Therefore, approximately 40 acres are represented by a single signal strength calculation. This applies to all existing blue service area on all plots and only to the green plot of the proposed facility. Meanwhile, the green plots of the 35-foot BECO 111 coverage and the 55-foot "Dump" coverage are prepared with a finer resolution (approximately 400-500 feet square). The finer resolution produces a more mottled effect in which white and green appear more interspersed. This can leave the impression that the high-resolution green coverage is less massive, and more feeble, than if it had been done at the lower resolution of the proposed facility's plot. These differences can distort the conclusions sought to be drawn from the Plots.

31. The Plots are based on computer estimations of coverage, employing characteristics such as the topography and assumptions about the land cover and land use characteristics. ("clutter"). Typically, such plots are rendered with an assumption about the overall (average) impact of the local clutter on a signal and typically do not account for individual trees or buildings, stands of trees, clearings, waterways, and the like. Hence, it is not possible to read such plots, especially at signal coverage edges, and categorically state that at a particular location the signal will be or will not be within the level specified, simply based on the color shown at that location. When computer estimations show that coverage overlap between two facilities will be a "close call," more precise analysis has to be performed to determine whether the close call is close enough or not close enough. Often, this precision can only be obtained with the use of "drive testing" in which a test antenna is erected at the proposed facility and a vehicle equipped with measuring instruments is driven into the area in question.

32. The signal level chosen in the Plots as the apparent go/no-go value (threshold value) is –81 dBm. (Signal levels shown in dBm are in decibels related to one milliwatt of power. Negative dBm figures represent levels less than one milliwatt. A –101 dBm signal is weaker than a –81 dBm signal.)

33. An attempt at substantiation of the –81 dBm threshold figure was submitted in the first Affidavit of Radio Frequency Expert dated August 6, 2001, ¶13 (at Volume 1, Tab B of the Affidavit of Willaim J. Proia). This substantiation starts with a reported minimum sensitivity of a Nextel radio, the level at which the receiver is unable to reliably receive a signal. Nextel states this figure is –101 dBm. The

figure is compensated by an antenna gain figure of "–9 dBm", a fade margin of "-5.5 dBm", and an "industry" in-vehicle penetration loss of "5 dBm." These figures are not backed up with references to scientific literature or industry specifications, and in some cases appear to be unusually high in my experience.

34. Wireless phones typically work at lesser signal levels than the –81 dBm threshold value selected by Nextel. Wireless phones will function reliably receiving signals 10 or 20 dBm lower than –81 dBm. For the purposes of the analysis in the paragraphs below, I have adopted the Nextel signal strength threshold of –81 dBm, with the understanding that signals often fall below this level and remain usable. To the best of my knowledge, Nextel has not provided credible substantiation for the selected level of –81 dBm as a coverage threshold for reliable automotive reception.

35. To verify the potential performance of an antenna mounted on a BECO tower in the WCS District (approximately BECO 101 or 102- see WCS District map and the Wayland Zoning Bylaw), on August 23, 2002, I conducted a drive test with a test signal emitted from the Old Landfill site. Exhibit DM-2, attached hereto and incorporated herein by reference, contains a detailed description of the methodology and the results of the test.

36. A drive test was performed for two reasons. First, the computer estimated plots are insufficient in providing rigorous signal strength performance data along Route 20 east towards Weston. Second, contrary to Nextel's claim, the difference of two thirds of a mile between the Old Landfill and the BECO 111 site may not

be significant. The intervening terrain is quite level and is totally unobstructed by terrain features.

37. East of BECO 111 the terrain rises from the valley and flood plain of the Sudbury River. Continuing east toward Weston, the terrain takes a steep dip near Shir Tikva Temple ("the Temple") and rises again past Mahoney's Garden Center. The terrain levels out somewhat as one continues toward and beyond the Weston/Wayland boundary.

38. I personally conducted the drive test and took the measurements. As explained in DM-2, with the assistance of a licensed user of the 800 MHz spectrum, RDC Communications, Inc, I set up a test antenna emitting a signal at approximately 100 watts effective power from 115 feet above the Old Landfill site. This would be the approximate height of antennas that would be attached to the nearby BECO towers, including BECO 102. I took measurements from a vehicle equipped with a roof-mounted antenna and specialized measurement equipment.

39. The results indicate that a substantial portion of Route 20 east of the intersection of Route 27 would be served from 115 feet above the Old Landfill by an average signal greater than –80 dBm. (See average signal strength graph, page 16 of DM-2.). The blue curve on the graph represents a series of measured signal strength values. Each value is an average composed of ten measurement samples. The average signal levels measured along Route 20 from Route 27 to the Wayland/Weston line remained at least –81 dBm for approximately 1.1 miles, and fell between –81 and –90 dBm for a total of about ½ mile in two segments. From Route 27 to the top of the hill, a distance of approximately one half mile (0.55

mi), the signal strength average remained at least –81 dBm. There is a clear depression in signal strengths beginning on the back of the hill, reaching a minimum at the terrain hollow by the Temple and rising thereafter. In this four-tenths of a mile distance, the average signal level did not fall below –90 dBm, which is still well above the claimed minimum sensitivity of the Nextel receiver and therefore potentially usable for the few-tenths of a mile in which this depression occurs. East of the terrain hollow, the test signal level returns to the -81 dBm range and maintains at least that level for about one half mile. Finally, the average signal level diminished below –81 dBm for approximately the last tenth of a mile to the Weston line, but not falling below –87 dBm.

40. This drive test data shows the potential coverage from the Old Landfill site extends along Route 20 to about the Weston/Wayland line. The terrain hollow by the Temple presents a signal shadow problem that should affect performance of a facility at the BECO 111 site as well as the Old Landfill. The average signal strength in this area never fell below –90 dBm. This observation is verified in further analysis performed by me for the Town of Wayland and described in this Affidavit and DM-2.

41. The coarse resolution of the Nextel Plots overlooks this terrain hollow and Nextel appears willing to accept its potentially diminished signal for the two- to four-tenths of a mile of Route 20.

42. I prepared a propagation model with my software (Comstudy 2.2) employing a higher resolution than Nextel's Plots. I found the signal depression in the terrain hollow by the Temple was indeed predicted by my software for both the Old

Landfill and the BECO 111 site. I also performed terrain profiles to the Weston line from each site to illustrate the impact of the terrain that Nextel apparently is willing to overlook. The results of these tests are contained in my Exhibit DM-2.

43. I also conducted a drive test at the Old Landfill site from an antenna height of 55 feet above ground, which is the Town's limit for new structures in the WCS District. While not as robust as the 115-foot Old Landfill coverage, the 55-foot height at the Old Landfill also provides substantial coverage toward the Weston line. The lower robustness of the 55-foot height coverage is seen in the graph on page 17 of DM-2 as a steeper drop in average signal level in the terrain hollow and in the last quarter mile before the Wayland/Weston line. However, the average signal level never fell below –90 dBm. Along the rest of Route 20 east of Route 27, the signal from the 55-foot height averaged better than or equal to –81 dBm.

44. Without clear substantiation, Nextel claims that the BECO 111 site will "eliminate" any coverage gap between planned Weston coverage and BECO 111 coverage. (See my paragraph 19 above). In addition to the coarse resolution discussed above, the location of the "planned" Weston facility is not consistent. Nextel shows predicted Weston coverage from a location that appears to coincide with the address of the First Baptist Church of Weston, 657 Boston Post Road. The Town of Weston bylaws permit wireless facilities concealed within religious or municipal structures already in existence. In my experience, antennas mounted within church steeples tend to be 40 to 60 feet in height above ground. Weston also permits 100- to 120-foot towers on certain parcels that do not include the

Baptist Church. The Police Station on Route 20 is one such parcel. Nextel has testified that it is considering development of a facility on Weston police property. The Plots, the computer-estimated propagation maps submitted by Nextel, may not properly represent the location and height of a future Nextel facility in Weston.

45. Based on the imprecision and inconsistency in the projection of Weston coverage, it is not possible for Nextel to claim the BECO 111 facility in Wayland will certainly connect with a "planned" Weston facility. Similarly, it is also not possible to claim that a facility in the WCS District will certainly fail to connect with a "planned" Weston facility.

46. Nextel's prohibition of service claim is thus based on the presently unpredictable connection with future coverage from Weston.

47. Based upon the drive test that I conducted and the Nextel Plots, it is my opinion that locating a facility in the Town's WCS District, particularly at BECO 102, would provide substantially the same range of coverage that Nextel seeks to provide from BECO 111.

48. Based upon the drive test that I conducted and the Nextel Plots, it is also my opinion that a 55-foot facility on a new tower at the Old Landfill would provide substantial wireless service coverage to Wayland and would provide substantial coverage to the Weston town line.

49. In addition to other claims about the WCS District, Nextel also states that the WCS District is too close to other Nextel facilities in Sudbury to the west, and would cause interference with these facilities. Nextel presents absolutely no data

to support this claim. Further, Nextel claims (see motion for summary judgment materials) that locations in the WCS District are within the service area of facilities located in Sudbury. The nature of the interference is not described or substantiated. Two possible interference mechanisms are generally considered in wireless network design: co-channel interference and elevated spectral noise. The principal of "frequency reuse" allows the wireless network operator to reassign the same radio channel to two wireless facilities so that two independent calls can occur on the same channel in two different places. When the network layout forces two customers to use the same channel in a manner that one call interferes with the other, co-channel interference exists. Meanwhile, the presence of many channels operating in the general spectrum that includes the wireless channel in use creates a background noise condition that may degrade the quality of a call. This noise issue is often taken into consideration in the calculation of the system link budget. Nextel has submitted some of the factors it claims to employ in its link budget, including the receiver sensitivity value, which as described above should include a background noise figure.

50. Nextel has given no data to support the claim that a facility at the "Dump" site violates the interference limitations of its network. To the contrary, Nextel's computer-estimated coverage plots reveal that the site marked "Dump" is within reasonable distances of existing facilities and should not be any more troublesome to Nextel's Network performance than its existing facilities are to one another. See Exhibit DM-3 for discussion of this fact.

51. In disparaging the WCS district as a viable location for the provision of wireless service, Nextel also claims, in its Memorandum of Law in Support of Plaintiff's Motion for Summary Judgment, page 5, "...the western portion of Wayland is already covered by an antenna facility located in an adjoining community." Nextel has not submitted Plots or other documentation showing only existing coverage. Even if such information were submitted to support this claim, it would likely not be meaningful, because the resolution of the plots submitted to date are woefully lacking in precision. The location marked "Dump" is below the top of the ridge running along the western side of the Sudbury River Valley. As with my finding on the terrain hollow by the Temple, in which the BECO 111 facility appears to have a change in coverage overlooked by Nextel's plot, it is likely that the coarse resolution of the plots overlooks the fairly steep drop from Sudbury into Wayland and thus over-reports –81 dBm coverage in western Wayland.

SIGNED UNDER THE PENALTIES OF PERJURY this 17th day of September, 2002.

David P. Maxson

Before me, Gitwin Hayes, Notary Public.

My commission expires: 7/31/09

Exhibit DM-1

Analysis Of Site Positions and Separations of Wayland Locations Discussed in this Affidavit.

Exhibit DM-1

Analysis Of Site Positions and Separations of Wayland Locations Discussed in this Affidavit.

"Dump" Site

The Sudbury transfer station and the Wayland transfer station are adjacent, separated by the town boundary. No coordinates were submitted by Nextel to describe the actual position used by the computer-estimated model for the "Dump" site, so I am relying on the position of the large round dot on the Nextel plots as the point of reference. It appears to be centered at about 42°21'51" North latitude, 71°23'05" West longitude, North American Datum of 1983 (NAD 83)), which according to my USGS 7-minute topographic map is in the Sudbury transfer station area. See map below for an approximation of the location of the Nextel "Dump" site.

The Nextel plots depict a yellow boundary that has the appearance of a town or district boundary because it is a closed polygon. The site marked "Dump" falls within this boundary, and one might conclude that this means the site marked "Dump" is within the town of Wayland. However, by comparison to a topographic map and to the WCS District map, the yellow boundary is not the Wayland boundary. Rather, the yellow boundary appears to be the boundary of a different sort of district, such as a Zip Code district.

Nextel Plot of Proposed Coverage

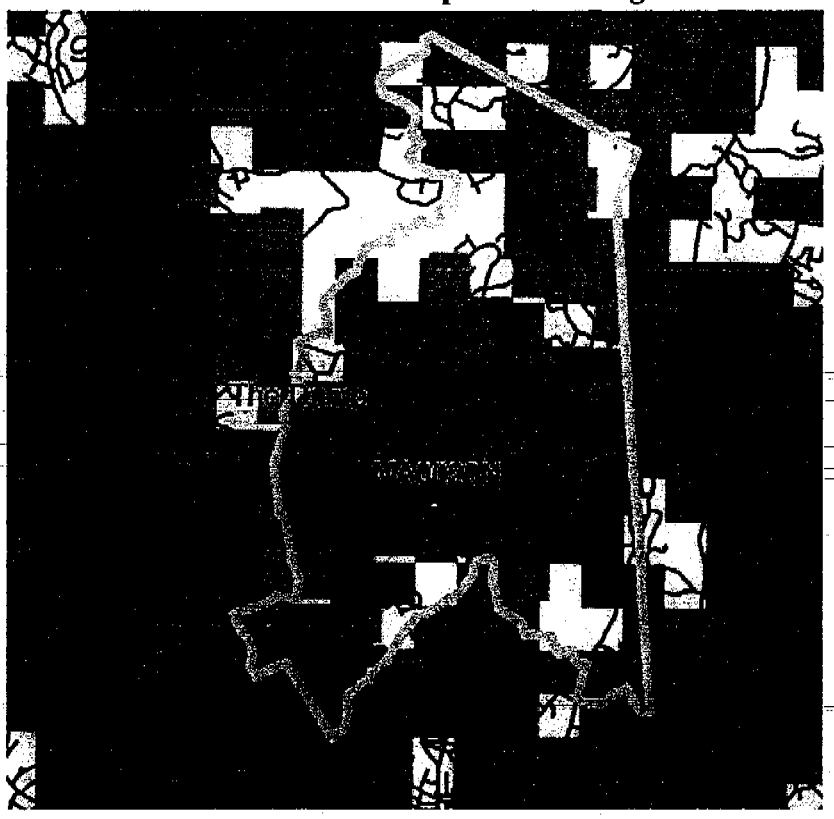


Exhibit DM-1 (Continued)

Had Nextel supplied geographic coordinates, full legends, and other pertinent information about its plots, there would be less uncertainty about its coverage claims. As it stands, it appears Nextel is confused about the locations and options available to it under the Wayland Bylaw.

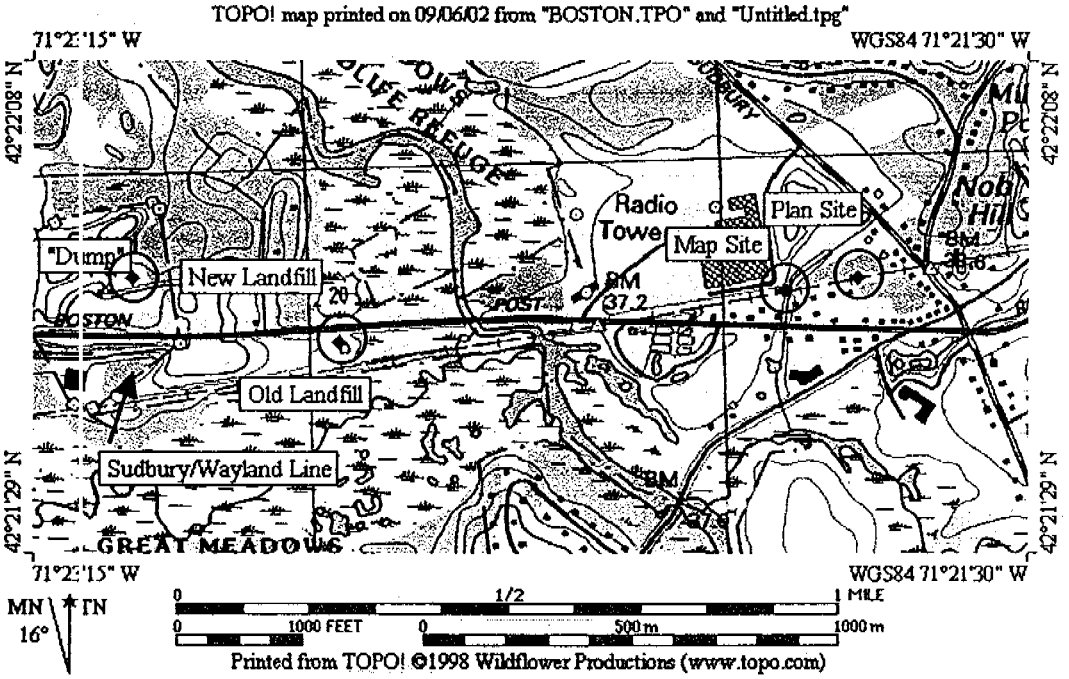


Exhibit DM-1 continued

The proposed site (BECO111)

Site plans submitted by Nextel, and prepared by Edwards and Kelcey, indicate geographic coordinates that do not appear to coincide with the position of BECO 111 as shown on the same plans. Sheet A-1 of the plans lists the center of the proposed tower in item 4 of General Notes as N42°21'50.7" by W71°21'48.2". This is shown on the map above as a diamond with a label "Plan Site."

Contradicting this is the position of the site on the Nextel Locus Map on sheet T-1 of the site plans. This is at approximately N42°21'50", W71°21'56", shown as "Map Site" on the map above. The two locations are approximately 0.14 miles apart (about 740 feet). The location of the Map Site is more consistent with the actual site drawings than the location of the coordinates Plan site, because of the configuration of the buildings, the wetlands and the length of MBTA right of way from Route 20.

Radio frequency engineers often look for coordinates on site plans from which to simulate wireless coverage. If the coordinates on the Nextel site plans are indeed wrong as the data suggests, it is possible that the computer-estimated plots of coverage from the proposed site are actually from the erroneous site 0.14 miles to the east.

Exhibit DM-1 (Continued)

Old Landfill

At the Old Landfill site south of Route 20, also called the "old Wayland landfill," our GPS unit indicated a position of N42°21'46.2", W71°22'43.2" (Garmin GPS unit model 12-XL, software version 4.58). This position is 83 yards north of the MBTA right of way, and 96 yards from the nearest BECO tower. At this position Broadcast Signal Lab conducted a drive test, described elsewhere in this Affidavit.

Using the site indicated on the Nextel Locus Map as the reference, below is a table of distances to the other locations discussed.

Site	Distance from BECO 111
"Map Site" based on Locus Map	Same
"Plan Site" based on plan coordinates	0.14 miles east
"Dump" site based on propagation map	0.95 miles west
"Old Landfill" site based on GPS, near BECO 102	0.64 miles west

Exhibit DM-2

Report on 800 MHZ Radio Signal Drive Test

in Wayland, Massachusetts

Broadcast Signal Lab

Report on 800 MHz Radio Signal Drive Test
in Wayland, Massachusetts

Purpose

On August 23, 2002, Broadcast Signal Lab conducted a "drive test" in Wayland, Massachusetts to determine the extent of wireless signal coverage from a location in the Wayland Wireless Communications Services District. The purpose of the test was to determine the nature and extent of the propagation of a signal in the 800 MHz frequency range when emitted from the Old Landfill site south of Route 20, at each of two antenna heights.

Equipment

An aerial lift crane was hired from Marr Crane service and was parked on the site, inside the fenced enclosure.[1] The lift was positioned at a height of about 115 feet for the first test and at about 54 feet for the second test.[2] These two heights were selected to demonstrate the signal coverage capability from 1) an overall height of up to 20 feet above the approximately 100-foot electrical tower and 2) an overall height above ground of 55 feet. These two criteria are defined in the Wayland wireless bylaw as height limitations for 1) attaching to existing towers or 2) installing a new tower.

To provide a test signal, Broadcast Signal Lab engaged the services of RDC Communications, Inc of Yarmouth, Massachusetts. RDC holds an FCC license, call-sign KNEB231, that permits it to perform test transmissions in the frequency band selected for this test. The 806-821 MHz frequency band was observed for activity prior to final selection of a frequency. Based on RDC's knowledge of the utilization of these frequencies, a channel was chosen that is currently licensed to a private commercial operator but is not yet active[3].

The 800-900 MHz frequency range was selected for the drive test based on the pending litigation by a Specialized Mobile Radio Service (SMR) provider involving a proposed facility in the general vicinity of the test site. The SMR service provider operates in the same frequency band as was employed in this test.[4]

A test signal was generated with a Kenwood TK940 radio operating at a transmitter output power of 13.5 watts. The transmitter was connected to a Bird Thruline wattmeter to measure the output power level. The wattmeter was connected, through a Belden 9913

[1] The crane was positioned with the base of the boom at approximately 42°21'46"North, 71°22'43"West, and 90 feet from the gate. This location is also about 84 yards from the center of the high tension line right of way and 96 yards roughly north of the nearest electrical stanchion tower.

[2] The height of the railing of the lift platform was measured team employing a Bushnell laser rangefinder model 800, with a specified accuracy of ±1 yard.

[3] The frequency is 806.5875 MHz

[4] This SMR service operates in the 806-821 MHz band, with paired frequencies in the 851-866 MHz band. It shares these bands with other SMR services. Also occupying the 800-900 MHz frequency range, in bands adjacent to the SMR bands, are the two cellular providers, Cingular and Verizon Wireless, with frequency assignments at 824-849 and 869-894MHz.

cable about six feet long, to an antenna mounted on the railing of the aerial lift platform. This short length of cable should attenuate the signal leaving the power meter and arriving at the antenna by about ½ dB.

The antenna, a Maxrad MCR-806 corner reflector antenna, was chosen for the manner in which it focuses its energy. This focusing characteristic, described partly by its "gain" figure, produces a main beam that effectively increases the transmitter output power on the horizontal plane, similar to the manner in which a lighthouse lens powerfully focuses the light of a small lamp. This gain is specified at a nominal value of 8.5 decibels.[5]

The test vehicle was a Mercury Sable station wagon with a ¼-wavelength antenna on a magnetic mount in the center of the exterior of the roof. The antenna is specified at unity gain in the 800 MHz frequency range. Both the receiving antenna and the transmitting antenna were vertically polarized. The receiving antenna is equipped with a ten-foot length of ¼-inch coaxial cable, providing an estimated signal loss of 1.5 to 3 dB[6].

Methodology

Broadcast Signal Lab principal, David Maxson, coordinated the test setup, verified all relevant settings, and conducted the test.

The effective power of the transmitter and antenna combination is 13.5 watts transmitter power plus 8.5 dBd antenna gain. This comes out to about 96 watts of Effective Radiated Power (ERP).[7] The plaintiff's Affidavit of Radio Frequency Expert reports that the facility will use a 100-watt effective radiated power.[8]

The test antenna was aimed easterly along Route 20 through Wayland center, the primary issue in the coverage debate. This provides the most predictable emitted test signal along the Route 20 corridor. The actual configuration of a wireless facility at the Old Landfill site can be designed to yield results similar to those in this test, by selecting antenna styles and orientations that best suit the coverage demands in the area.

The test signal was a continuous wave carrier containing no modulation. This provided ease of identification and simplified received signal power measurement.

[5] The gain characteristic is referenced in this case to the performance of a reference dipole antenna and its gain is formally described as 8.5 dBd.

[6] The cable losses at both the transmitting and receiving ends of the test system are not counted in the analysis. It is assumed for the purposes of the test that these cables present zero loss. Consequently, the measured received signal levels, based on the 96-watt ERP, are understated by an estimated 2 to 3.5 dB.

[7] Part way through the first test run, the transmitter warmed up and stabilized at an output power of 13.5 watts. It initially started at 15 watts. The initial measurements taken during this time are based on the slightly higher output power. It represents about 10% excess in the ERP for the first part of the test, which corresponds to a negligible ½ dB inconsistency. These initial measurements were adjusted and are reported as if they were measured with a 13.5-watt transmitter power.

[8] The power calculations in the Affidavit of Radio Frequency Expert, August 6, 2001, by Supriya Prabhakar, indicate an "ERP" of 100 Watts per channel.

A spectrum analyzer and communications test set, model Com 120-B manufactured by IFR, was installed in the front seat of the vehicle and attached to the antenna. The analyzer has a receiver mode in which it displays the selected signal spectrum, and the measured received signal power, both numerically and graphically. The numerical measured signal power was collected at approximately 2-second intervals for later processing (included in the tabulation attached).[9]

The tabulated data is recorded in units of dBm, decibels above (or below) one milliwatt. The numbers are all negative, indicating the received signal levels are *less than* one milliwatt. A reading of –70 dBm is stronger than a reading of –80 dBm.

Signal Level Threshold

The plaintiff's documents employ a signal level threshold of –81 dBm. That is, a signal found to be at less than this threshold signal level is regarded by the plaintiff as insufficient. The plaintiff employs computer-estimated plots to show where it expects the signal from existing and proposed facilities to be sufficient or not. We must emphasize that the –81 dBm figure is not properly supported at this time and is not an inherent limit on radio reception. However, for some of this analysis, we will take the –81 dBm figure as a starting point of reference.

Computers Estimate; Field Surveys Measure

In predicting a signal level, a computer program models the expected signal loss from the source to a matrix of locations surrounding the source. This is displayed in a map with colored areas depicting signal levels that are predicted to be above the selected threshold. Computer models estimate coverage based on a database of terrain elevation data and on predictions and assumptions about how local land use and land cover may absorb, reflect, or diffract radio signals.

In contrast, a drive test actually measures the received signal along public ways, which inherently accounts for every tree and building in the path from source to destination.

Estimations Predict a Theoretical Average; Measurements Must be Averaged

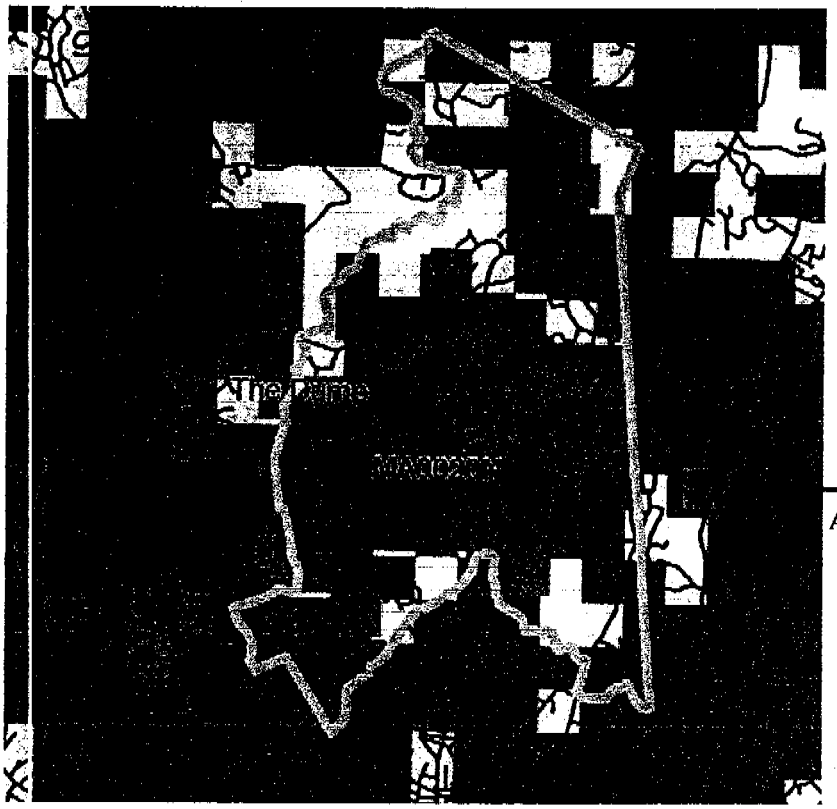
Another difference between field measured signals and computer estimations is that computer estimations present some type of average[10] signal level expected in a small block of space depicted as a square (or "pixel") on the coverage map. One pixel of color may represent an area as small as one hundred feet square or as large as one quarter mile square, depending on the plot preparer's discretion and the tools available. Each color pixel is assigned a single calculated value intended to represent a typical signal level that

[9] Specialized wireless signal test systems can measure signal levels and record GPS positions. Due to the time and cost constraints on this study, a wireless signal test system was not employed. Instead, another instrument commonly employed to characterize radio frequency signals, the spectrum analyzer, was employed to perform the measurements. Consequently, GPS measurements were not recorded at each measurement and the resulting data is equally time distributed rather than distance distributed. A GPS unit was placed on the dashboard and positions were manually recorded at major points along the route.

[10] We use the term "average" somewhat loosely here. Various statistical methods can be employed to produce results in forms other than a strict average, for instance in percentiles or log-normal averaging.

would be found throughout the area of the pixel (see graphic below). In actual field conditions, actual signal levels will vary throughout the area represented by a single pixel. It is the job of the computer software to predict a typical figure for that pixel as accurately as it can.

Coarse Resolution Computer Estimated Coverage
Nextel Plot



One Pixel

About ¼ mile across

In contrast to the computer plot's estimation of a single signal level for a defined area of the map, field measurements are spot measurements of received signal level at individual locations. An individual field measurement is not necessarily indicative of typical signal levels in an area. To average out the variations in measured signal levels we have presented a processed version of the data in an averaged format.[11] The data was collected at two second intervals, at speeds varying with traffic. Hence, each ten-point average represents about twenty seconds of data collection.

The Link Budget in Computer and Field Studies

A computer model computes signal losses and gains through a "link budget." The transmitter has an output power that suffers minor loss going through coaxial cable to the antenna. The antenna has a gain figure, yielding an effective power of the signal in a particular direction. Path loss due to the distance between transmitter and receiver is

[11] Signal levels in dBm were converted to linear values of milliwatts and a running average of ten consecutive points was computed. The results were reconverted to dBm for consistent display. This is shown in the attached graphs.

computed. Path loss due to the intervening terrain is also factored in (e.g. will the signal have to diffract over a hill to get to the receiver?) A factor is also included to estimate the impact of vegetation and structures on the signal. Finally, the characteristics of the receiving antenna are computed to derive the received signal level entering the receiver's electronics. This is the figure commonly reported in units of dBm.

The field measurements inherently incorporate all the elements of the link budget's gain and loss computations. Transmitter power, line loss, antenna gain, distance, obstructions, receiving antenna characteristics, and line loss into the receiver (if any) are included in the measurement when the receiving antenna is plugged into a spectrum analyzer.

Comparing the Test Configuration with an Actual Facility

The differences between the test arrangement and an active facility are limited to the transmitting antenna and receiving antenna. The test transmitting antenna has less gain than that which an SMR Service would likely use. To compensate for lower gain, a higher transmitter power is employed. The resulting effective power of the test antenna should be in the same ballpark as that of an actual facility.[12]

The receiving antenna is similar in size and performance to that of the antenna on a handheld phone. However, to produce consistent and repeatable results, it is critical that a test receiving antenna be placed in the open, and in this case, on a broad ground plane (the car roof). Typical path loss analysis presented by wireless companies in their computer plots simulate this exact signal path: base station antenna, path loss, open-air receiving antenna.

Observations on the Data

The data for the 115-foot antenna height (page 16) suggest that its coverage would be quite usable toward the Weston line. The impact of the terrain depression at Temple Shir Tikva is apparent in the measurements, but it may not be serious or significant. Determination of the impact of this terrain depression on the plaintiff's coverage will have to be based on several things:

- What is the real signal level threshold that draws a line between "service" and "prohibition of service?"[13]
- If there is an occurrence of below-threshold signal in this depression, is it of sufficient size or depth to consistently drop calls; or is it brief and tolerable?

[12] The lower-gain test antenna, operating at an effective power comparable to a wireless facility, will produce unrealistically strong signals within the area immediately surrounding the test site. This was seen with signal levels greater than –40 and –30 dBm within about ¼ mile of the site. At this distance, and beyond, the main lobe of the antenna emits the specified effective power and becomes the primary influence because the elevation angle from the receiver to the base antenna beyond a quarter mile is less than six degrees.

[13] A scientific treatment of the plaintiff's determination of coverage threshold must be evaluated. Mobile and base radios have specified internal noise figures and signal sensitivities, which are only partially documented by Nextel. It is upon this fundamental information that a realistic signal threshold can be built and defenced.

- If there is an occurrence of below-threshold signal in this depression, is it of sufficient impact on service to the public to constitute prohibition?

While the above three questions are essentially legal ones involving public policy that engineers can only try to quantify for the courts to decide, the following factor is key in determining the impact of the terrain depression on coverage:

- What is the coverage of other existing or proposed facilities penetrating this location?

Plaintiff's coverage data suggest that there is a facility in Weston providing service to and across the Wayland/Weston Line (see image p.4 above). A brief scan of base station frequencies while we were in that area resulted in no obvious strong SMR signals in the area, including a tour into Weston on Route 20 (To Sutton Place). Public records indicate that Nextel has not yet constructed a facility in this region of Weston.

At the Weston Line, the signal from the 115-foot height at the Old Landfill site was stronger than the existing signals arriving from other base stations in the area. Without this supposed Weston facility in action, it is not possible to tell how far across Weston or into Wayland it actually covers. Therefore, there is no basis for an argument that any particular Wayland site will or will not properly overlap with Weston coverage.

Finally, our observations about potential coverage from the 115-foot height at the Old Landfill should be compared to the projected coverage from the BECO 111 site, which is the site that is the subject of the Nextel Complaint. We have pointed out weaknesses in the computer methodology used to demonstrate coverage from the BECO 111 site (see image, p.4 above). It is likely, given that the ground elevations and antenna heights at both the BECO 111 site and the Old Landfill site are the same, the terrain shadowing effect of the hill and depression by the Temple will be quite similar. See the line of sight graphs from each location to the Weston line on Route 20, below. This is addressed further, below, when Broadcast Signal Lab propagation models are discussed.

Also, the line of sight graphs and the drive test signal level graphs show how the signal level improves with the return of radio line-of-sight on the next hill (by Mahoney's). This recovery of elevation is advantageous to both the Old Landfill and the BECO 111 sites' coverage toward Weston.

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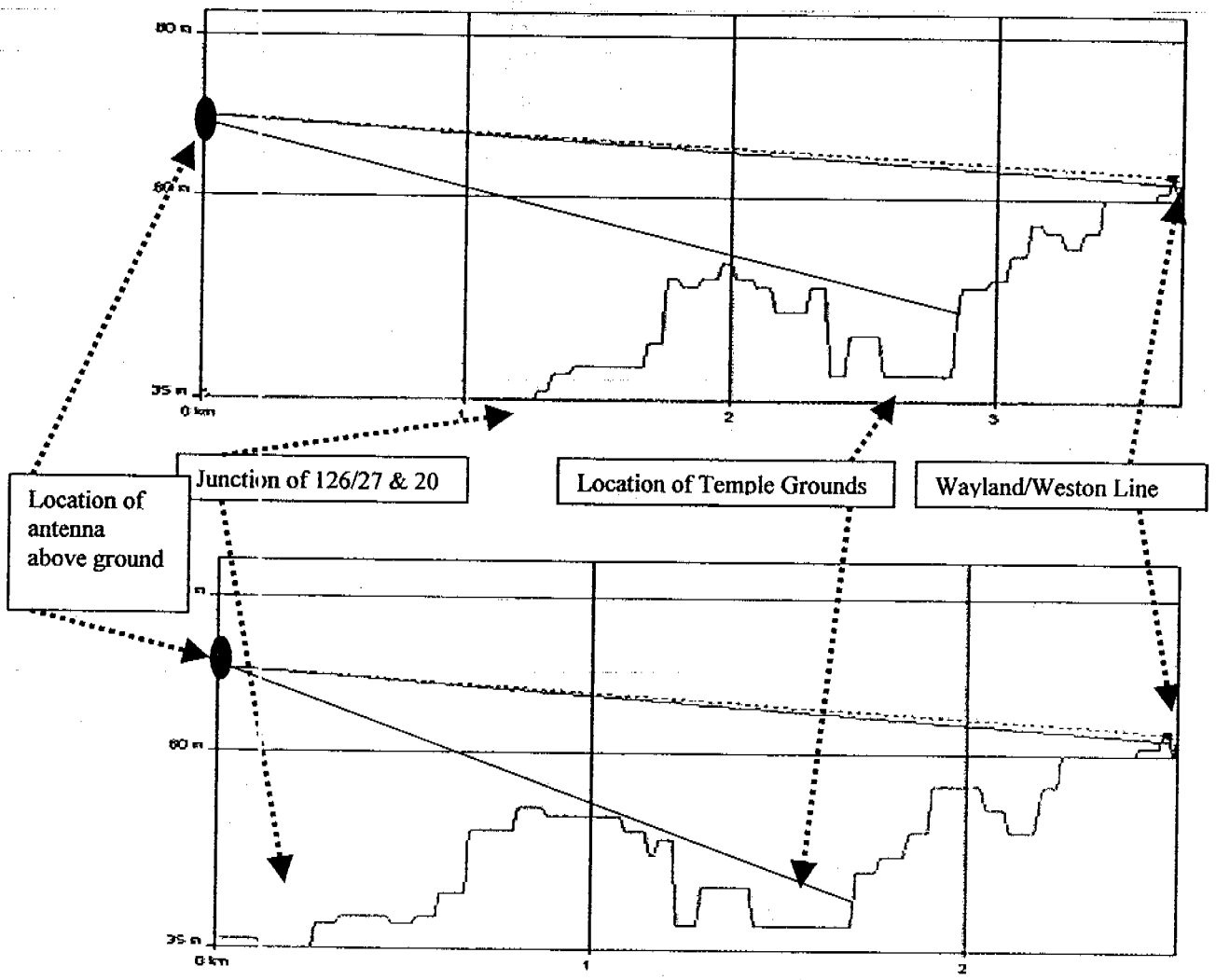
Lines of Sight from Old Landfill Site (below) & BECO 111 Site (2nd below)



The above graphs show line of sight from a 115-foot antenna height at both sites. The vertical scale is exaggerated with respect to the horizontal scales. The horizontal scales of the two graphs are different, because the Old Landfill site is farther from the Weston town line. The left side of the graphs are the tower locations of the two sites with the antenna heights represented on the vertical scale. The right sides are the Weston line. The trough into which the black lines go is the depression at the Temple on Route 20. Note how neither antenna location would reach over the hill into the trough. The signal differential plot appended to this report supports this observation, as does the drive test data.

The 55-Foot Antenna Height

To this point, the 55-foot height at Old Landfill has not been discussed. Its coverage data is included in the attached tabulations and signal strength graph. There is a distinct difference in the coverage from the lower height, compared to the 115-foot height. In a general way, the terrain depression presents much more of an obstacle to signals from the 55-foot height. Signals fall into a deeper and longer signal strength trough. Heading farther east, the signal levels recover somewhat, but not as well as the signal from the 115-foot height.

The 55-foot antenna height at the Old Landfill site could work for a significant portion of the area served by the Old Landfill 115-foot height. The 55-foot height is more terrain-challenged than the 115-foot height when it comes to the hills east of Routes 27 and 126.

If the bylaw had permitted wider-spread installation of 55-foot height structures around town, a combination of 55-footers throughout town could potentially provide reasonable coverage.

Deciding between the 55-footer and the 115-footer

The photo from the 55-foot height shows that it would graze the tree vegetation that arises on the opposite side of the river. This may diminish the quality of the signal reaching up and beyond the hill east of Routes 126 and 27. The combined effect of the terrain disadvantage and the vegetation disadvantage of the 55-foot height is seen in the drive test data. (See graphs appended below)

If further analysis determines that none of the options (BECO 111 and two Old Landfill heights) will provide the required service in the depression by the Temple and that this is critical to the provision of service in Wayland, the 55-foot height at the Old Landfill appears to still be sufficient to illuminate much of the town, along the Sudbury River valley, along which Routes 27 and 126 run, and including Wayland center.

Computer-Estimated Coverage based on Drive Test Data

We employed computer analysis to attempt to reasonably replicate the drive test results. Once the plots of the drive tested facilities (Old Landfill at 115 feet and 55 feet, pages 18 and 20 below) were roughly matched to the drive test data, we prepared a plot of the BECO 111 site with 115-foot high antennas (page 19 below), with the same tuning factor. In the software employed for these plots, the tuning was performed by adjusting a single overall value to the plots to align as closely as possible the Old Landfill plots to the results of the drive tests. This single adjustment value applies equally to all pixels on the plots, and equally to each of the three plots.

The three plots show that not only is the Old Landfill coverage left with a below-threshold signal depression in the area of the Temple, but also the BECO 111 facility suffers this same interruption. Nextel's choice of a coarse resolution plot seems to hide this important factor even from Nextel.

Other Directions from the Old Landfill site.
The differences in our coverage plots show that the greatest advantage the BECO 111 site has over the Old Landfill site is coverage along Route 126 heading north from Routes 20 and 27. Even with the proposed coverage from the BECO 111 site, coverage on 126 to the northeast is shown in the plaintiff's plots possibly to be incomplete, requiring a potential facility in the northeast of town or in an adjacent town.

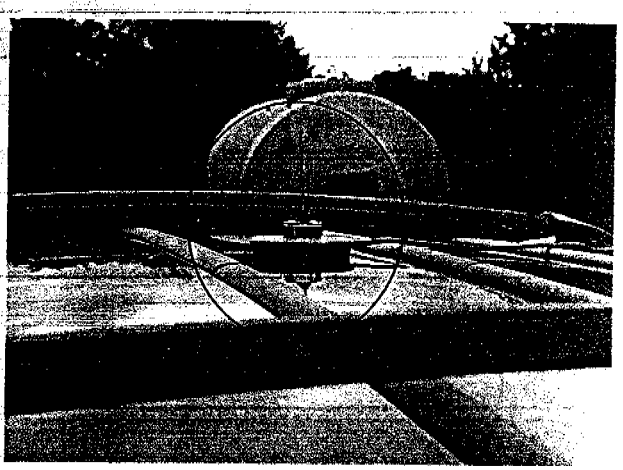
Conclusions
The coverage data obtained from the drive test shows the following:

- The 115-foot and 55-foot Old Landfill antenna heights provide reasonable coverage at least as far as the elevation rise east of Routes 126 & 27 on Route 20.
- The 115-foot height at the Old Landfill provides a reasonable signal almost to the Weston line on Route 20 (pending settlement of what signal level is truly unsatisfactory). The 55-foot height at the Old Landfill is less robust in eastern Wayland, but also offers substantial coverage in that area.
- Both heights, but more the 55-foot height, show the terrain depression at the Temple presents a serious impediment to signal penetration from the west. The terrain profiles suggest that a facility at the BECO 111 site would have similar problems in the depression.
- The published coverage data submitted by the plaintiff seems too coarse to resolve the signal trough in the terrain depression. Either this depression is fully acceptable to the plaintiff, or the plaintiff has overlooked it and will later determine that further remedies in the east of town would be needed. In either case, as best as can be discerned, there is no significant difference between the performance of the BECO 111 location and the Old Landfill location, each at 115 feet, in this terrain depression.
- Coverage traveling north of Route 20 on Route 126 is likely to diminish sooner by locating at the Old Landfill site rather than the BECO 111 site. Nextel documents suggest that coverage from the BECO 111 site north on Route 126 also may not fully connect with coverage from existing facilities to the north. Therefore the small potential coverage loss on Route 126 north, obtained by locating at the Old Landfill instead of BECO 111, should not be material to the completion of a network along Route 126.
- Coverage in other directions is unlikely to be significantly affected by the change from the BECO 111 site to the Old Landfill site at 115 feet.

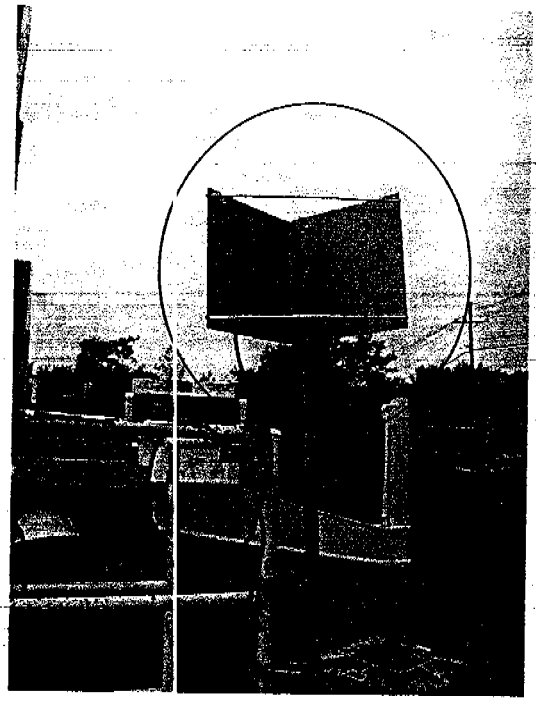
David Maxson
September 7, 2002

Broadcast Signal Lab

Photos of Test Equipment

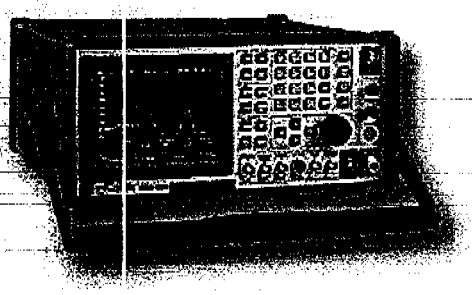


Magnetic antenna on roof of car



MRC 806 reflector antenna

Kenwood TK490 radio



IFR COM-120B Spectrum Analyzer
(manufacturer's photo)

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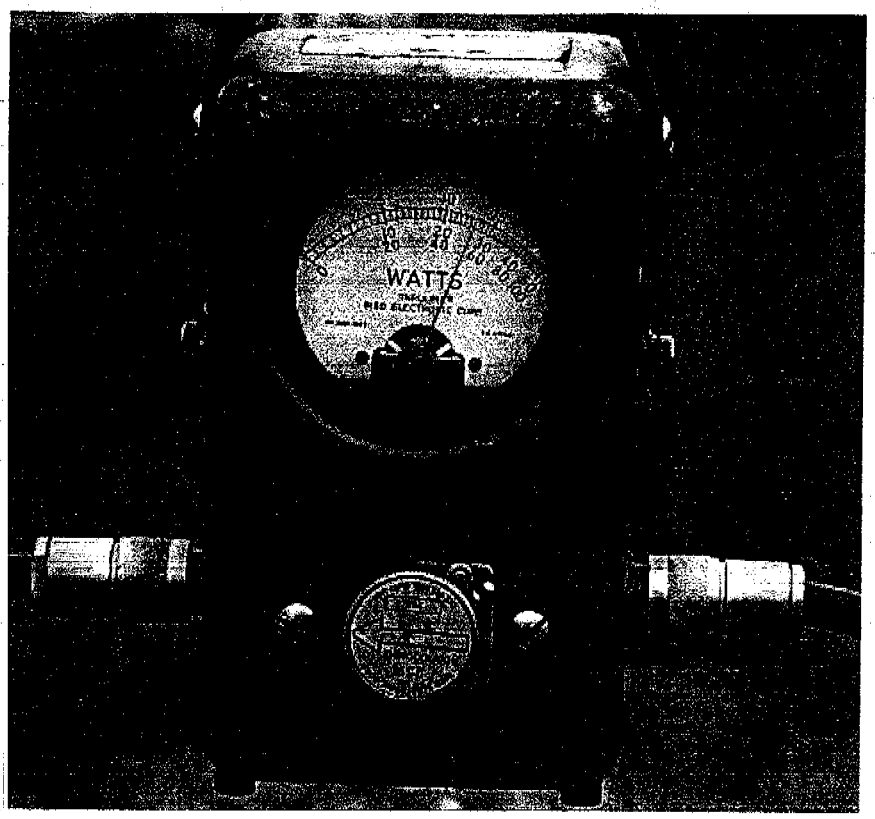
Photos of Test Equipment (continued)



Bird wattmeter measuring output power of the test signal (approx. 13.5 watts)

The crane at 115ft (left) and 55ft (right) AGL

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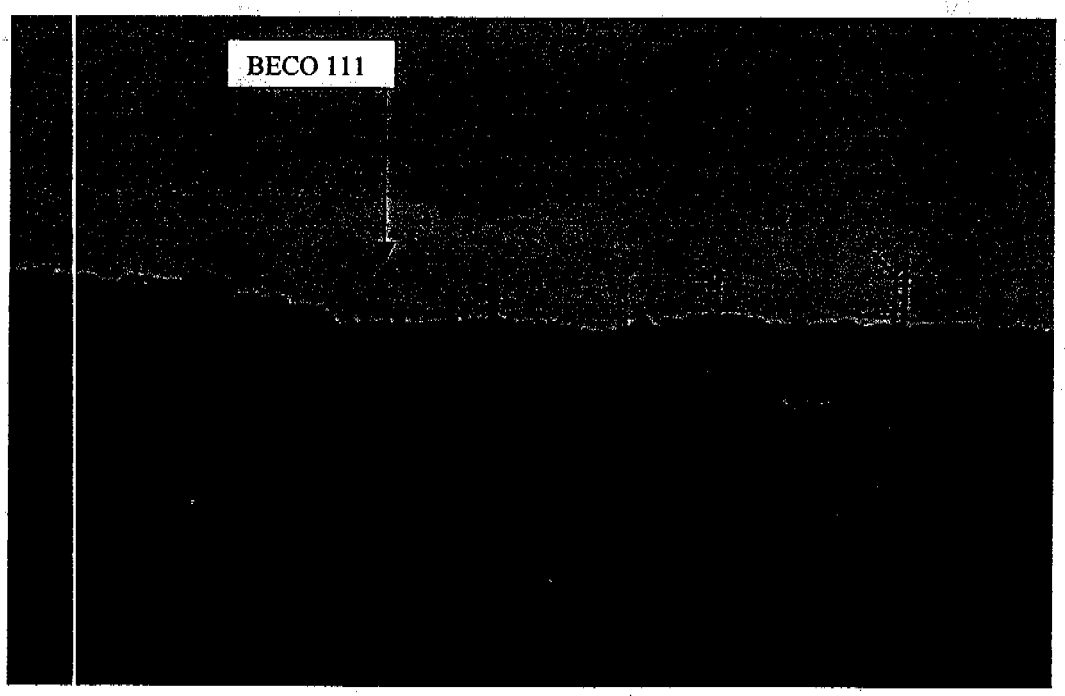
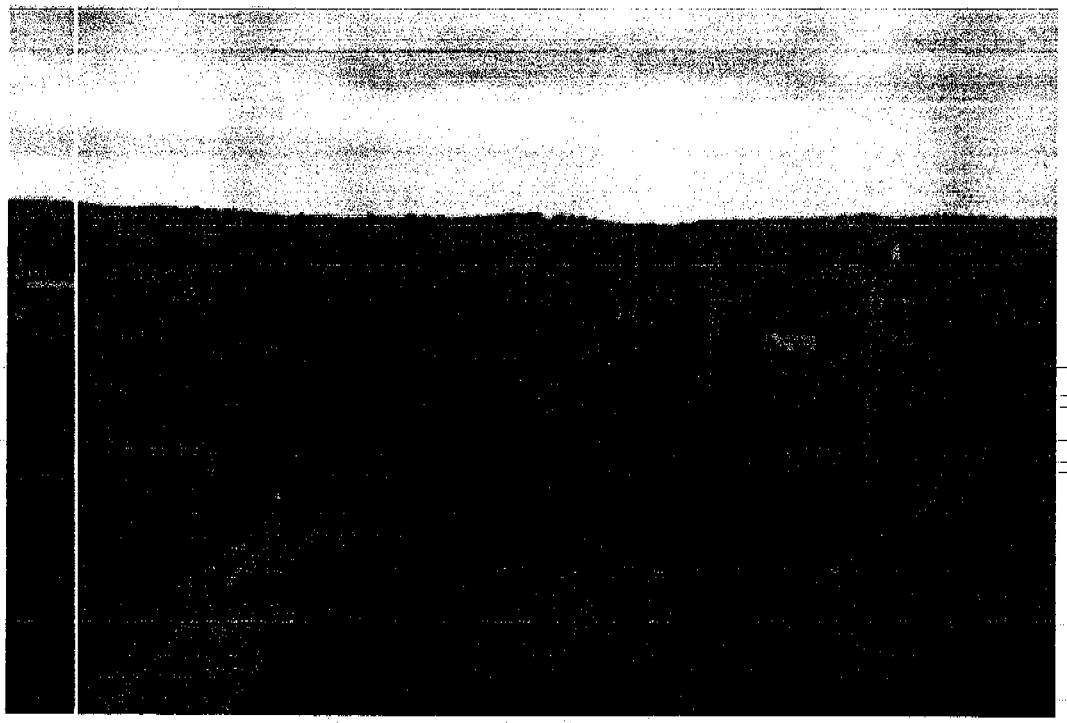
Easterly Views from Crane



From 55ft AGL – looking east along Rt. 20 (approximately 110 mm equivalent zoom)



From 115ft – looking east along Rt. 20 running through Wayland (approx 110 mm equivalent zoom)

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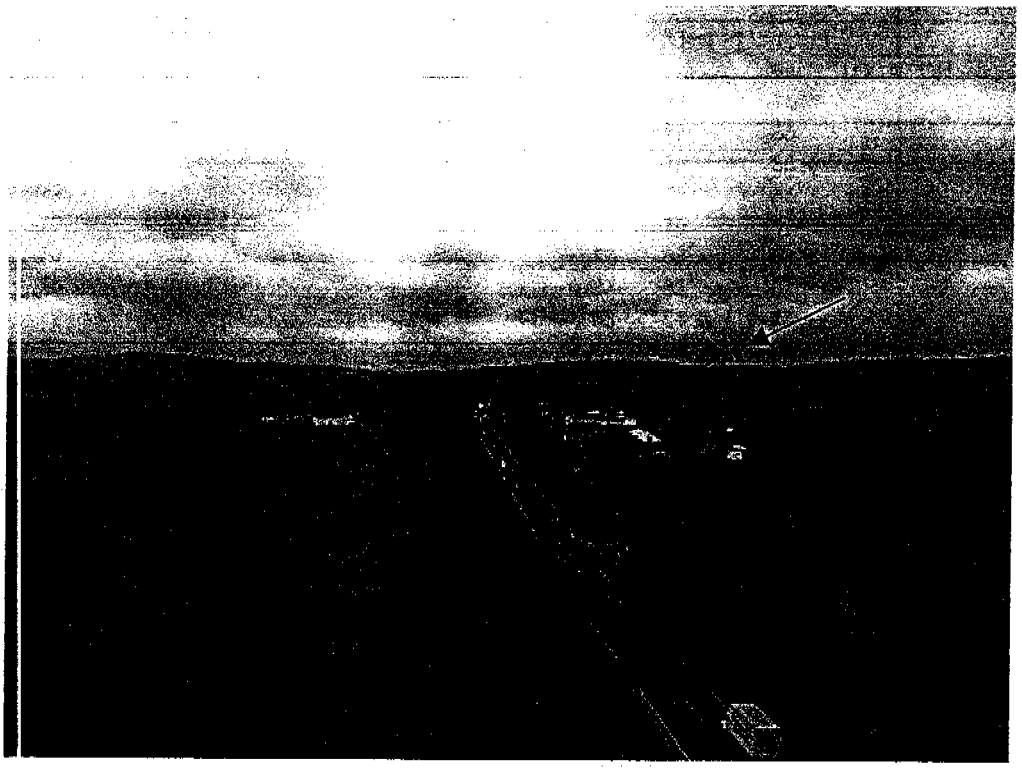
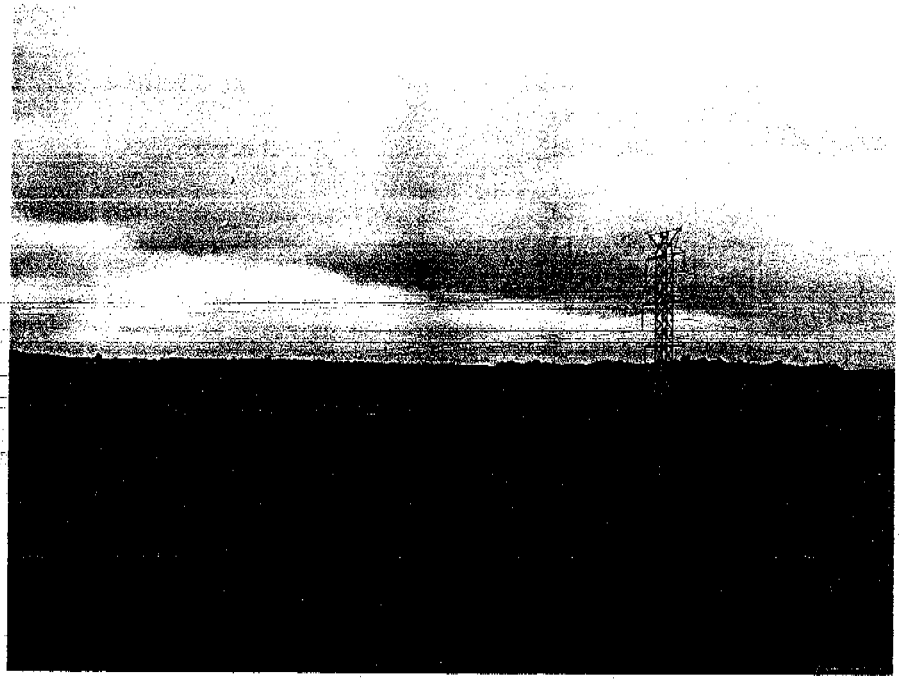
Other Views from Crane



115ft AGL looking west along Rt. 20 towards Sudbury monopole



From 55ft AGL, looking south. This is the closest adjacent BECO tower, BECO 102.

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RECEIVED SIGNAL LEVELS FROM OLD LANDFILL ANTENNA AT 2 HEIGHTS

(normalized to 13.5W transmitter power)

#	55-ft test	115-ft test		#	55-ft test	115-ft test	
	dBm	dBm	LOCATION		dBm	dBm	LOCATION
1	-62	>-70		51	-74	-75	
2	-62	>-70	Russell's East Drive	52	-77	-88	
3	-72	>-70		53	-78	-86	
4	-72	>-70		54	-78	-85	
5	-70	>-70	Citgo	55	-79	-90	
6	-70	>-70		56	-88	-80	
7	-70	>-70		57	-83	-81	
8	-72	>-70		58	-84	-76	
9	-72	>-70		59	-89	-76	
10	-73	>-70		60	-85	-85	Stone wall on curve
11	-67	>-70		61	-80	-85	
12	-72	>-70		62	-78	-85	
13	-76	>-70	Wayland Village shopping center	63	-82	-90	
14	-73	>-70		64	-80	-86	Top of Hill
15	-73	>-70		65	-85	-84	
16	-72	>-70		66	-84	-83	
17	-76	>-70		67	-74	-84	
18	-71	>-70		68	-84	-79	
19	-70	>-70		69	-82	-86	
20	-67	>-70		70	-97	-85	
21	-68	>-70		71	-92	-91	
22	-75	>-70		72	-86	-85	Rear of Hill
23	-72	>-70		73	-101	-80	
24	-73	>-70		74	-85	-85	
25	-82	>-70		75	-85	-91	
26	-71	>-70		76	-85	-93	
27	-72	>-70		77	-87	-88	
28	-69	>-70		78	-104	-90	
29	-74	>-70		79	-92	-89	
30	-71	>-70		80	-93	-92	
31	-75	-72	Cross 126/27	81	-104	-89	Temple in Hollow
32	-73	-86		82	-92	-91	
33	-78	-71		83	-86	-92	
34	-76	-69		84	-99	-86	
35	-74	-69		85	-90	-80	
36	-78	-80		86	-76	-89	
37	-71	-71		87	-88	-86	
38	-70	-85		88	-91	-86	
39	-76	-76		89	-90	-103	
40	-71	-83		90	-82	-84	
41	-84	-78		91	-84	-91	
42	-85	-81		92	-86	-76	
43	-79	-68		93	-80	-86	
44	-81	-74		94	-79	-79	Luigi
45	-74	-78	Approaching start of uphill curve	95	-85	-80	
46	-79	-91		96	-79	-82	
47	-88	-75		97	-90	-83	Mahoney
48	-76	-82		98	-77	-78	
49	-75	-76		99	-82	-76	
50	-78	-83		100	-76	-84	

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#	55-ft tes	115-ft test	
101	-73	-78	
102	-78	-75	
103	-75	-85	
104	-86	-82	
105	-79	-73	
106	-77	-74	Vokes
107	-75	-74	
108	-76	-75	
109	-85	-84	
110	-87	-83	
111	-81	-75	
112	-87	-73	
113	-82	-76	
114	-102	-69	
115	-94	-76	
116	-85	-73	Wayland Variety
117	-84	-85	
118	-108	-90	
119	-95	-87	
120	-85	-83	
121	-95	-88	
122	-85	-84	
123	-92	-90	
124	-84	-85	
125	-100	-91	
126	-96	-89	
127	-79	-84	
128	-92	-84	Weston Line
129	-87	-82	

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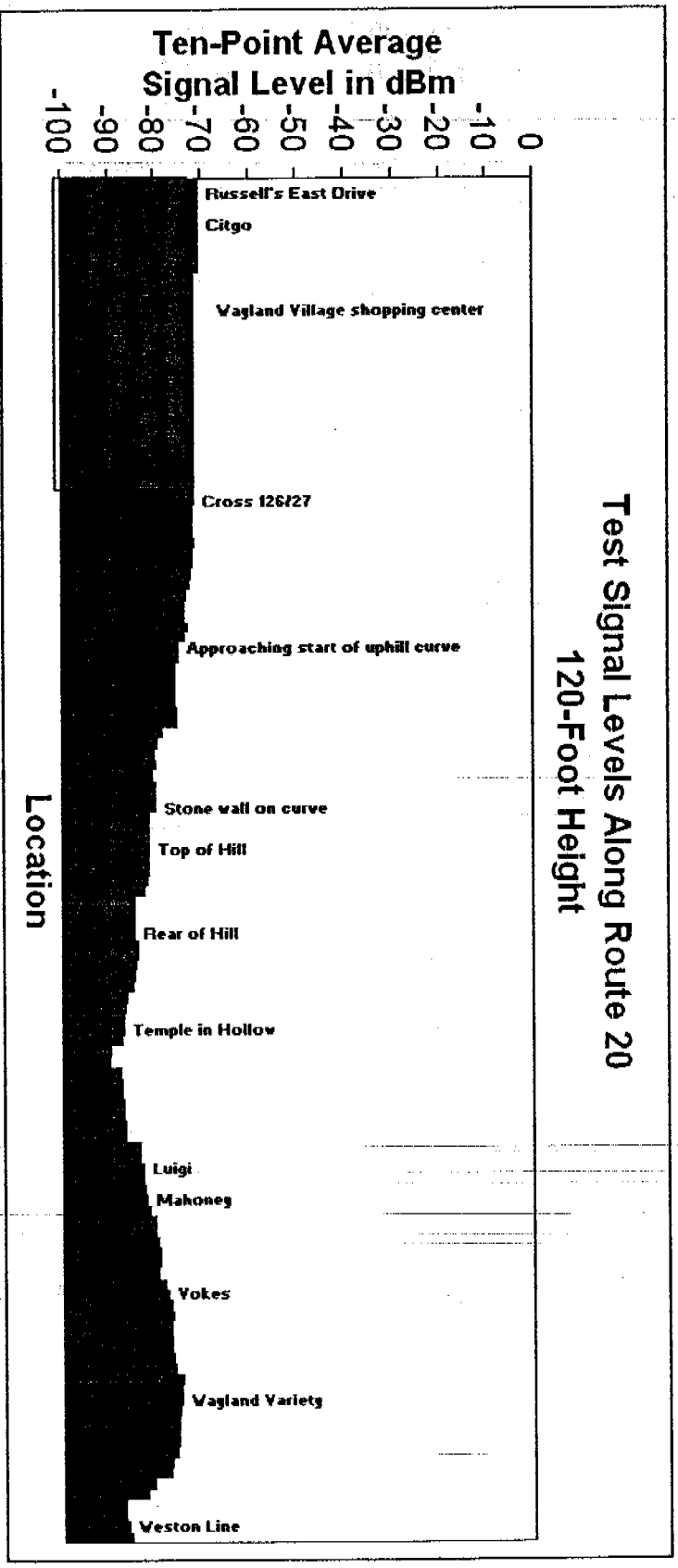
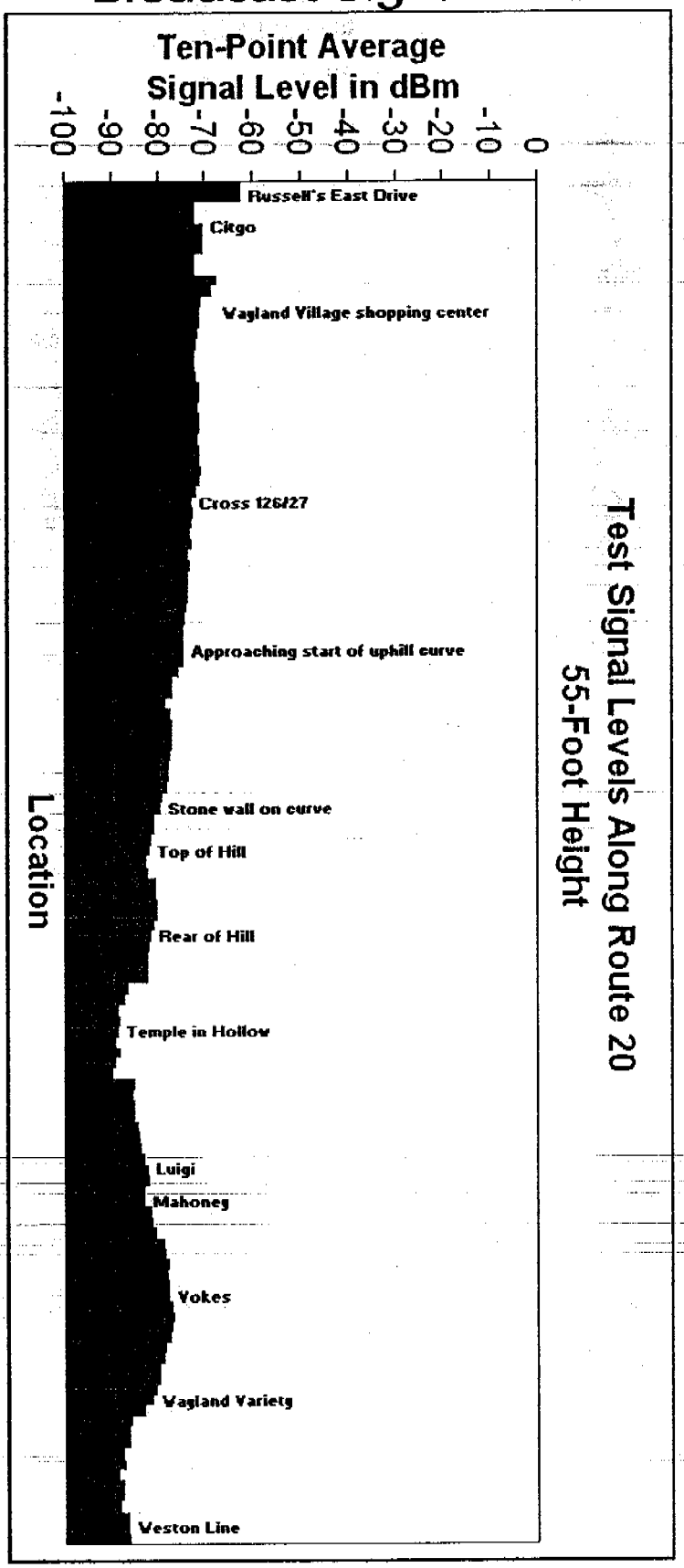


Broadcast Signal Lab

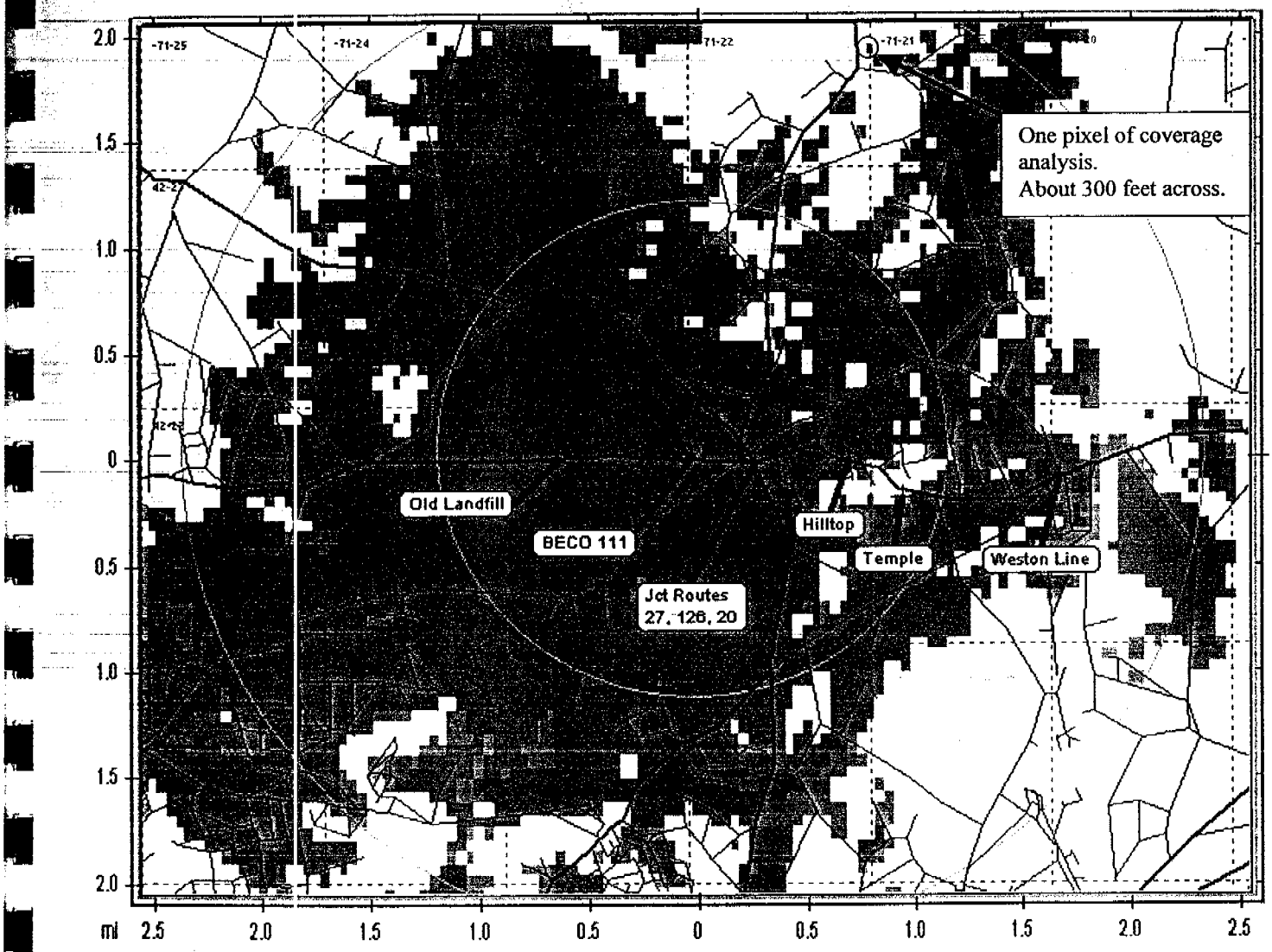


Broadcast Signal Lab, LLP
503 Main Street
Medfield, Massachusetts 02052

Broadcast Signal Lab

Old Landfill @ 115 Feet

-81 dBm service from Old Landfill at 115 feet above ground



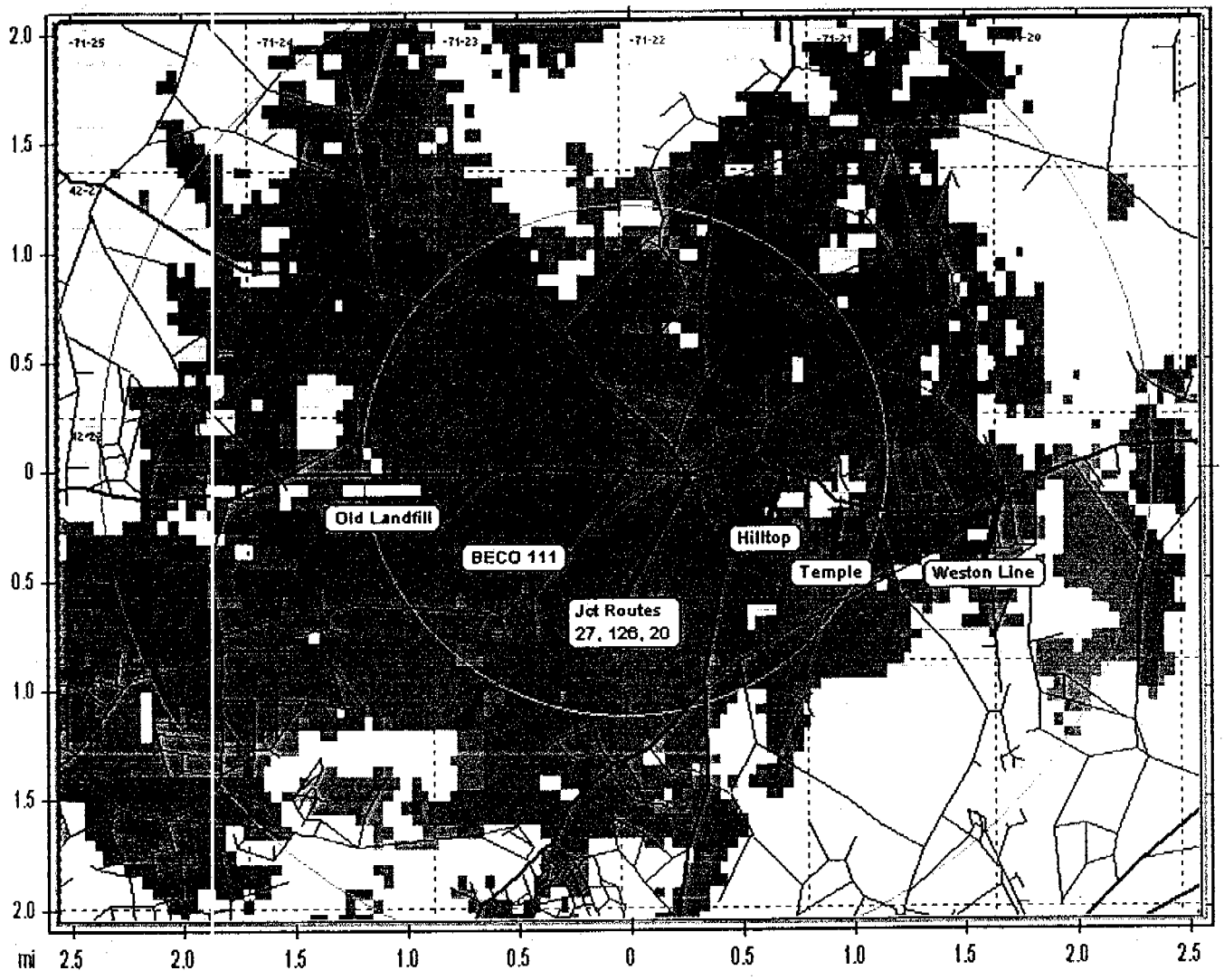
Green areas greater than Nextel -81 dBm threshold; Blue areas greater than -86 dBm

Comstudy 2.2 software, ver 1.2.2 Longley-Rice propagation calculation
USGS 3" elevation model
USGS 30" land use/land cover database
100 W ERP, 0 dB receive antenna

Broadcast Signal Lab

BECO 111 @115 Feet

-81 dBm service from BECO 111 at 115 feet above ground



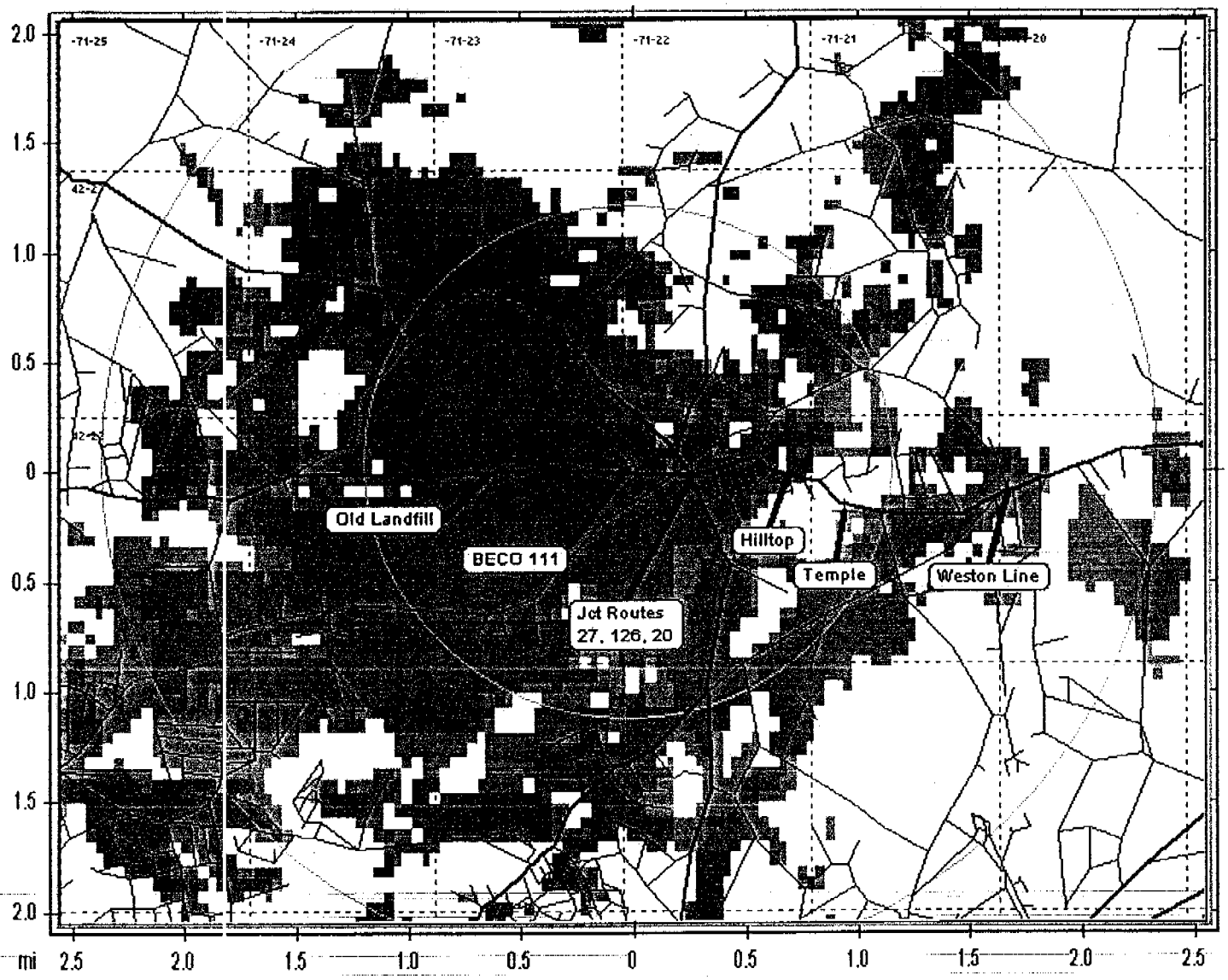
Green areas greater than Nextel -81 dBm threshold; Blue areas greater than -86 dBm

Comstudy 2.2 software, ver 1.2.2 Longley-Rice propagation calculation
USGS 3'' elevation model
USGS 30" land use/land cover database
100 W ERP, 0 dB receive antenna

Broadcast Signal Lab

Old Landfill @ 55 Feet

-81 dBm service from Old Landfill at 55 Feet



Green=-81dBm predicted service, blue=-82 to-86 dBm

Comstudy 2.2 software, ver 1.2.2 Longley-Rice propagation calculation
USGS 3" elevation model
USGS 30" land use/land cover database
100 W E.R.P, 0 dB receive antenna

Exhibit DM-3

Nextel Existing Facility Separations

Exhibit DM-3
Nextel Existing Facility Separations

Nextel claims the "Dump" facility location is too close to other facilities and would cause interference with the other facilities. The plotted locations do not support this claim.

Nextel submitted a set of computer-estimated coverage plots to illustrate its predicted coverage from several locations and antenna heights. These plots contain locations of existing (and "planned") sites in the area surrounding Wayland. All locations indicated as red dots were included in the tabulation.

Nextel submitted no data on the coordinates of these sites, the antenna heights and the power levels. Therefore, I cannot compute separation distances or the effects of the terrain on each of these facilities.

To determine on a first-level basis whether the site marked "Dump" may be too close to existing facilities, I chose to look at the separation distances of the existing Nextel facilities from one another. Without a map scale on the Nextel plots, I measured their separations in millimeters directly on the plots.

The distance of each facility to the two closest facilities on the plots is shown in the table below. In the second column, the distance between the "Dump" site and the three closest facilities is shown. There are three existing sites that are closer together than the "Dump" site is to the nearest existing site.

Separations of Nextel Facilities
In mm on 8 ½ X 11 plot

Existing Nextel Sites Around Wayland	3 Nextel Sites Closest to the "Dump" Site
31	
33	
33	
36	
37	37
41	38
58	52
58	
66	
69	
69	
73	

This data suggests that the location of the "Dump" site is within normal distances of existing facilities. As there are no radical changes in terrain characteristics in the area, the existing facility separations should be a strong indicator of acceptable ranges of

Exhibit DM-3 (Continued)

facility separation. Additional information on the exact facility configurations and interference calculations should be provided by Nextel to demonstrate its claim of unreasonable interference from a facility in the WCS District.